

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the present application.

LISTING OF CLAIMS

Claims 1 to 8 (Cancelled).

9. (Currently Amended) A method for repairing a nuclear fuel assembly, comprising:

providing a repair sleeve, the repair sleeve having a shaft with a first end, a second end and a diameter, the diameter configured to fit into a guide thimble opening of a top nozzle of the fuel assembly, wherein the diameter of the shaft is dimensioned such that an exterior of the shaft ~~snugly~~ fits into the guide thimble opening, wherein the shaft has at least two openings, and at least two tendons extending through the openings, the tendons configured to deflect in an instance of a horizontal load on the tendon during insertion, each of the tendons having a dimple projection configured to be inserted into a dimple of a guide thimble sleeve and the repair sleeve having a lapped edge for installation on the top of the top nozzle of the nuclear fuel assembly; and

inserting the repair sleeve in the guide thimble opening in the top nozzle of the nuclear fuel assembly such that the ~~dimples~~ projections of the tendons project into the dimples of the guide thimble sleeve; and

inserting a thimble insert assembly into an interior of the repair sleeve.

10. (Original) The method according to claim 9, wherein the step of inserting the thimble insert assembly into the interior of the repair sleeve prevents further deflection of the repair sleeve in a horizontal direction.

AMENDMENTS TO THE DRAWINGS:

Please amend the drawings as contained in the replacement sheets containing Figures 1 and 2 attached herein. No new matter has been added to the specification through the submission of these replacement drawings.

AMENDMENTS TO THE SPECIFICATION:

Please cancel the paragraph beginning on page 4, line 15 and replace it with the following paragraph:

--The repair sleeve 10 has a shaft 14 which is configured to allow a structural load transfer of force from the body of the fuel assembly through the top nozzle 12 of the fuel assembly. The repair sleeve 10 is configured with a first end 24 and a second end 26. The second end 26 is configured to be inserted into a nozzle opening 30 in the top nozzle 12 of the fuel assembly. The first end 24 may protrude from a top surface 38 of the top nozzle to allow for connection of lifting components as required. The first end 24 may be configured such that an installer may easily differentiate the first end 24 from the second end 26. Differentiation may be through geometric variation, such as an end which flairs outwardly, through the incorporation of a hole, or marking the exterior of the first end 24. Other configurations are possible and as such, the configuration presented in Figure 1 is but one exemplary embodiment.--.

Please cancel the paragraph beginning on page 5, line 1 and replace it with the following paragraph:

--The shaft 14 may be configured with a plurality of sleeve openings 28. The number of sleeve openings 28 may be varied for the shaft 14. Tendons 20 may be positioned through the sleeve openings 28. The tendon width 40 may be varied such that the overall physical dimensions of the tendons 20 may be altered. The tendons 20 may be configured with a projection 16 which corresponds to openings in a dimple area 34 in the guide thimble sleeve 32. The embodiment provided in Figure 1 illustrates a connection between a first dimple area 34 and the projection 16 of the tendon 20. The repair sleeve 10, however, may have an overall length chosen such that the projection 16 of the tendons 20 extend to a second or third dimple area further inside the fuel assembly guide thimble. The diameter of the sleeve 10, except for the projection 16, may be a constant value.--.

Please cancel the paragraph beginning on page 5, line 13 and replace it with the following paragraph:

The length of the projection 16 which projects into the dimple area 34 may be configured to closely fit into the overall shape defined by the dimple area 34.

The projections 16 may be configured in a trapezoidal shape, a hemispherical shape or other appropriate geometry. The number of projections 16 in contact with dimple areas 34 may also be varied such that more or less structural support is established. The number of projections 16 per tendon 20 may also be varied. Tendon length may be chosen such that the tendon 20 may extend to and between multiple dimple areas, providing additional structural support connection.

Please cancel the paragraph beginning on page 5, line 22 and replace it with the following paragraph:

--Referring to Figure 2, a second embodiment of a repair sleeve 70 is illustrated. The repair sleeve 70 has a shaft 72. The repair sleeve 70 has a first end 56 and a second end 58. The second end 58 is configured to be inserted into a guide thimble opening of the top nozzle 52. The first end 56 of the repair sleeve 70 may be configured with a lapped edge 54 which extends beyond an external top surface 74 of the top nozzle 52. The lapped edge 54 may have an external diameter which is greater in circumference than the external diameter of the opening of the top nozzle 52 for the guide thimble 50. Although illustrated as a circular lapped edge 54, other configurations are possible, such as square, hexagonal, or octagonal for example. The lapped edge 54 may be finally configured while the repair sleeve 70 is installed in the top nozzle 52. Alternatively, the lapped edge 54 may be preformed prior to installation of the repair sleeve 70.--.

Please cancel the paragraph beginning on page 6, line 1 and replace it with the following paragraph:

-- A projection 60 may be formed on a tendon 66 of the repair sleeve 70. The length of the tendon 66 may be chosen such that the projection 60 is placed in a dimple area 76 formed from the swaged area 78 of the guide thimble 50 and the guide thimble sleeve 68. The contact established between the projection 60 and the dimple area 76 may be configured to allow a transfer of a specified amount of force. Similar to the first embodiment, the repair sleeve 70 may be modified such that the overall length of the sleeve 70 may reach multiple dimple areas in the guide thimble 50. The projection 60 may be formed in any geometric configuration such as a hemispherical, trapezoidal or other arrangement.--.

Please cancel the paragraph beginning on page 6, line 11 and replace it with the following paragraph:

--Referring to Figure 3, a graph of the structural capacity of the repair sleeve 10 is illustrated. The vertical axis of the graph represents load carrying capacity of the repair sleeve 10. The horizontal axis of the graph represents overall position of the repair sleeve. As illustrated, the repair sleeve provides for an increase in load with a corresponding increase in displacement. Load carrying capacity then decreases after a maximum load carrying capacity is reached. Load carrying capacity is related to the amount of penetration of the projections into the dimple area. Greater penetration of the projections into the dimple area allows greater load carrying capacity.--.

Please cancel the paragraph beginning on page 6, line 25 and replace it with the following paragraph:

--The connection is used during lifting of the fuel assembly to allow the individual fuel rods to be lifted in unison with a desired factor of safety. The shaft 14 is split in the location of the dimple area to allow the tendon 20 to deflect into the dimple area.--.

Please cancel the paragraph beginning on page 6, line 29 and replace it with the following paragraph:

--Operationally, a repair sleeve 10 is provided. The repair sleeve 10 is inserted into a guide thimble opening in the top nozzle 12 of the nuclear fuel assembly such that the projections 16 of the tendons 20 project into the dimple area 34 of the guide thimble sleeve. The insertion may be performed through a robotic device, or remote delivery tooling to install the sleeve in an irradiated environment or through use of a crane. The tooling can be configured to deliver singular or multiple sleeves at a time and install the sleeves to the engaged position. The insertion of the sleeve 10 in the top nozzle 12 causes the tendons 20 of the sleeve 10 to flex inward toward a centerline of the sleeve 10. The sleeve insertion is then continued until the projections 16 of the sleeve 10 intersect a dimple area 34 of the swaged area 18. The tendons 20 of the sleeve 10 then extend away from a centerline of the sleeve 10 to allow the projections 16 to project into the dimple area 34. A thimble insert assembly 1 (control component, BPRA, WABA, plug) of the fuel assembly is

then inserted into an interior of the repair sleeve 10. The installation of the thimble insert assembly into the repair sleeve 10 prevents the projections 16 from exiting the dimple area 34 through plastic deformation of the sleeve 10. A structural connection is thereby established between the projections 16 and the dimple area 34. The first end 24 may be configured to extend from the top nozzle 12 or may be manipulated such that a desired geometric configuration is established.--.

Please cancel the abstract and replace it with the following abstract as provided on page 8 of this response: